इंटरनेट मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”
Mazdoor Kisan Shakti Sangathan
“The Right to Information, The Right to Live”

“पुराने को छोड नये के तरफ”
Jawaharlal Nehru
“Step Out From the Old to the New”

IS 12305 (1988): Laboratory sintered (fritted) filters, porosity grading, classification and designation [CHD 10: Glassware]

“ज्ञान से एक नये भारत का निर्माण”
Satyanarayan Gangaram Pitroda
“Invent a New India Using Knowledge”

Act Number 22 of 2005
The Indian Parliament
RIGHT TO INFORMATION

Made Available By
Public.Resource.Org

“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”
Bhartṛhari—Nītiśatakam
“Knowledge is such a treasure which cannot be stolen”

BLANK PAGE

BRUTUM FULMEN

IGNORANTIA JURIS NON EXCUSAT

PROTECTED BY COPYRIGHT

UDC 542·67·07

(Reaffirmed 1998)

Indian Standard

SPECIFICATION FOR LABORATORY SINTERED (FRITTED) FILTERS, POROSITY GRADING, CLASSIFICATION AND DESIGNATION

1. Scope — Prescribes the requirements, methods of sampling and tests for a range of laboratory sintered filters with their classification, grading of porosity and designation.

1.1 It is applicable to laboratory filters, made of glass, vitreous silica, ceramics, metals and plastics materials.

2. Terminology — For the purpose of this standard the following definitions in addition to those covered in IS : 1382-1981 'Glossary of terms relating to glass and glassware (*first revision*)' shall apply.

2.1 *Sintered (Fritted) Filter* — A filter produced from porous material formed by the bonding of particles.

2.2 *Permeability* — A characteristic of a filter related to the rate of flow through it under specified conditions.

2.3 *Pore Size Index* — A characteristic of a filter related to pore diameter.

3. Grades and Designations

3.1 Filters shall be graded according to their pore size index into one of the eight grades specified in Table 1.

3.1.1 In the case of filters to be used for special purposes, where the pore size index falls within narrower range than those given in Table 1; it should be indicated by stating both the maximum limits of the range.

3.2 Each grade of filter shall be designated as shown in col 2 of Table 1. It consists of the upper limit of pore size index range, expressed in micrometres (μm) preceded by the letter '*P*'.

4. Requirements

4.1 *Finish and Workmanship* — The filters shall be of good finish, workmanship and shall not shed particles under conditions of normal use.

4.2 *Construction* — It shall be regular in shape and shall be symmetrical about the axis.

4.3 *Leakage* — The filters, when tested for maximum pore diameter by the method prescribed in Appendix A, shall have no leakage due to faults in the material or inadequate sealing into the holder.

4.4 *Working Pressure* — It shall withstand a working pressure differential of 1 bar applied in the normal direction of use by using a suitable measuring pressure device.

Note — 1 bar = 100 kPa = 10^5 N/m^2 = 750·24 mm Hg.

4.5 *Pore Size Index* — The pore size index of the filters, when tested in accordance with the method specified in Appendix A, shall be within the limits specified in Tabte 1 for the corresponding grade.

Note — It is recommended that filters be manufactured with pore size Indices near the mean of the range of the appropriate grade.

4.6 *Uniformity* — The filters shall pass the requirement of uniformity of pore size, when tested according to the method specified in Appendix B.

4.7 *Air Permeability* — The permeability of the filters, when tested in accordance with method specified in Appendix C, shall comply with the requirement given in col 2 of Table 2.

Note — The filter under test shall be mounted suitably for carrying out the tests as given in **4.3** to **4.7**.

Laboratory ware and Related Apparatus Sectional Committee, CDC 33; General Laboratory Glassware Subcommittee, CDC 33 : 4 [Ref : Doc : CDC 33 (8630)]

Adopted 1 January 1988	© August 1988, BIS	Gr 4

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

TABLE 1 GRADING OF LABORATORY SINTERED FILTERS

(*Clauses* 3.1, 3.1.1, 3.2 *and* 4.5)

Sl No.	Designation of Grade	Pore Size Index, µm	
		Min	*Max*
(1)	(2)	(3)	(4)
i)	*P* 1·6	—	1·6
ii)	*P* 4	1·6	4
iii)	*P* 10	4	10
iv)	*P* 16	10	16
v)	*P* 40	16	40
vi)	*P* 100	40	100
vii)	*P* 160	100	160
viii)	*P* 250	160	250

Note — Please see Appendix E for correspondence between old and new designation for porosity grading of laboratory sintered filters.

TABLE 2 AIR PERMEABILITY OF SINTERED FILTERS

(*Clause* 4.7)

Grade	Minimum Permeability (Airflow at 1 m bar)
(1)	(2)
	cm^3/cm^2, min
P 1·6	0·72
P 4	1·98
P 10	4·98
P 16	10·2
P 40	30
P 100	198
P 160	402
P 250	498

Note — The values relate to filter discs up to 6 mm thick.

5. Packing and Marking

5.1 *Packing* — Each sintered filter shall be suitably packed so as to avoid any shredding, disintegration and breakage during transit. A copy of Appendix D shall be packed with each filter to assist the users for selecting the right sintered (filters) in the redesignation.

5.2 *Marking* — Each package shall be marked permanently and legibly with the following:

a) Name of the manufacturer or his recognized trade-mark;

b) Designation of porosity grade (*see* **3.1**);

c) Diameter of the disc, if it is round; or largest surface area, if in any other shape;

d) Lot No. for identification or manufacturing date;

e) If they are supplied as pre-sterile then the sterility date shall be marked and with the word 'Sterile';

f) If sintered filter is for single use only, then it should he marked as 'For Single Use'; and

Note — The use of term, 'Disposable' is not acceptable.

g) Type of material used for the sintered filter shall also be marked. If glass is used, the quality of glass shall be marked according to IS : 2303-1963 'Method of grading glass for alkalinity'.

5.2.1 *Certification marking* — Details available with the Bureau of Indian Standards.

6. Sampling

6.1 Representative samples of the filters shall be drawn as prescribed in Appendix D.

APPENDIX A

(*Clauses* 4.3 *and* 4.5)

METHOD FOR DETERMINATION OF LEAKAGE AND PORE SIZE INDEX

A-0. The method measures the pressure at which the first air bubble breaks away from the filter under assumptions of static conditions in the system. The pressure shown by the manometer may be calibrated to indicate the maximum pore size but provides an indication of the maximum pore diameter, which is related to the maximum size of particle that the filter will pass.

A-1. Procedure — Clean the filter thoroughly so that it is free from detergents and any other extraneous material.

A-1.1 Saturate the filter thoroughly with a suitable test liquid indicated in Table 3. Connect an adequate source of clean, dry air supply at an accurately controlled pressure, for example, using a needle valve. Attach the manometer to indicate the actual pressure at the filter as shown in Fig. 1.

TABLE 3 SUITABLE TEST LIQUIDS

Sl No.	Test Liquid	Nominal Surface Tension at 20°C	Filter Material
(1)	(2)	(3)	(4)
		N/m	
i)	Ethanol, 95 percent (*v/v*)	0·022	All
ii)	ISO propanol (*v/v*)	0·022	All
iii)	1 1 1 - trichloroethane	0·025	All except plastics material
iv)	Water	0·073	All*

*Polytetrafluoroethylene filters, which are not wetted by water.

A-1.2 Cover the filter with a layer of the test liquid, as shallow as is convenient and ensure that all the pores are impregnated. In the case of flat form of filter, there should be no excessive variation of hydrostatic head over its working area. Where the hydrostatic head is significant, the equivalent pressure units are to be deducted from the pressure reading of the manometer to give the effective pressure.

A-1.3 When a domed filter is being tested, bubbles tend to appear first at the uppermost region of the dome, owing to the varying hydrostatic head. In that case, tilt the filter to bring different regions into the uppermost position.

A-1.4 The hollow filters, for example, cylindrical, should be supported with the axis horizontal and suitably rotated.

A-1.5 If the filters comprise a fine grade material supported on a coarser grade, the filter characteristics stated should be those of the finer grade and the filter should be tested in such a way that the bubbles appear at the surface of the finer grade material.

A-1.6 Increase the air pressure gradually until the first air bubble breaks away from the surface of the filter. In case of hollow filters ensure that all the free liquid is driven out of the central cavity of the filter. Read the pressure at the filter from the manometer. Repeat the test taking the precautions stated above and obtain concordant results with the pressure being increased slowly.

A-2. Calculation — Calculate the pore size index as follows:

$$d = \frac{40\,\gamma}{P}$$

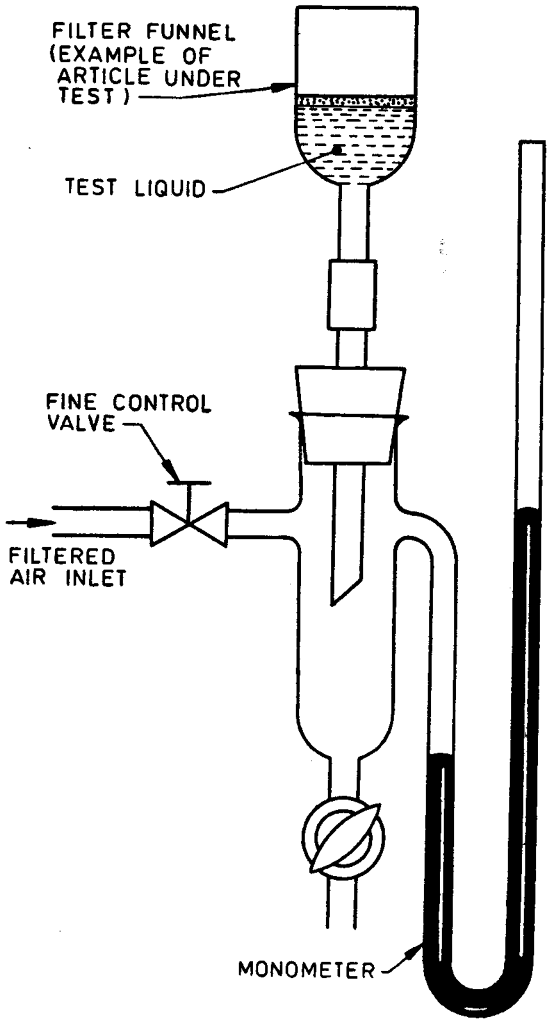
where

d = maximum pore diameter in microns,

γ = surface tension of test liquid in newton per metre, and

P = the effective pressure in bar.

Note — 1 bar = 10^5 N/m^2 = 750·24 mm Hg = 100 kPa.



WARNING — FOR SAFETY REASONS, THIS APPARATUS MUST BE SUITABLY SHIELDED WHEN IN USE.

FIG. 1 APPARATUS FOR DETERMINATION OF PORE SIZE INDEX

APPENDIX B

(*Clause* 4.6)

METHOD FOR ASSESSING UNIFORMITY OF FILTERS

B-1. Procedure

B-1.1 Follow the procedure specified in Appendix A for determination of pore size index. Observing the first air bubble (*see* **A-1.4**), increase the air pressure until bubbles emerge uniformly over the upper surface and note the new pressure readings.

B-1.2 The test shall be considered satisfactory if the new pressure reading corresponds to a pore size index not less than the minimum for the grade in Table 1.

APPENDIX C

(*Clause* 4.7)

METHOD FOR DETERMINATION OF AIR PERMEABILITY

C-0. Principle

C-0.1 This method measures the rate of flow of air through a filter under specified conditions. It is related to the rate of liquid flow through the filter.

C-1. Procedure

C-1.1 Clean the filter thoroughly and dry. Assemble the filter in a suitable apparatus as shown in Fig. 2. Establish a suitable pressure difference across the filter and maintain this during the test.

C-1.2 Measure the air flow rate by means of a suitable air flow meter.

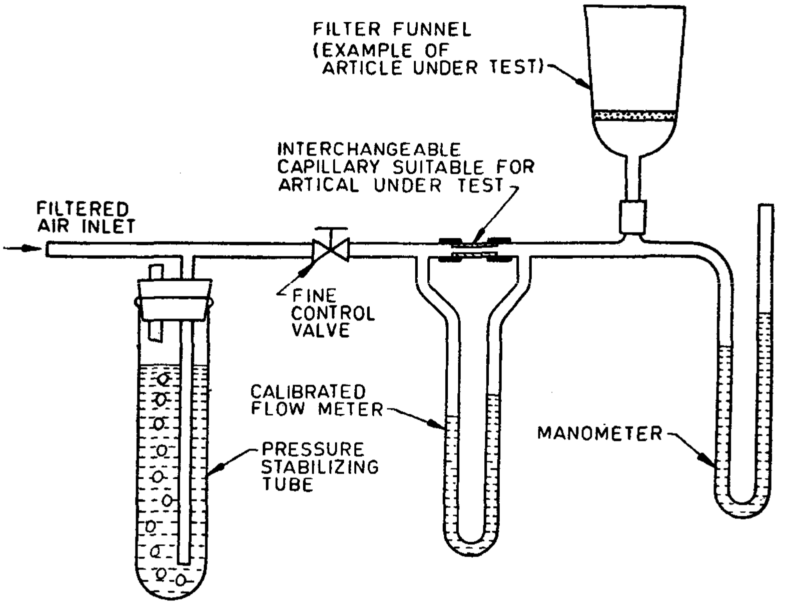


FIG. 2 APPARATUS FOR DETERMINATION OF AIR PERMEABILITY

C-1.3 Determine the effective surface area of the filter, making allowance for the part of the filter near the edge which is rendered ineffective due to fixing process.

C-4. Calculation — Calculate the air permeability as follows:

Air permeability per millibar pressure difference, expressed in cubic centimetre per square centimetre per minute [$\text{cm}^3/(\text{cm}^2 \text{ min})$] $= \frac{Q}{A\,P}$

where

Q = air flow rate, cubic centimetres per minute;
A = effective surface area of filter in square centimetre; and
P = pressure difference in millibars.

APPENDIX D

(*Clauses* 5.1 *and* 6.1)

SAMPLING OF LABORATORY SINTERED (FRITTED) FILTERS

D-1. Sampling

D-1.1 *Lot* — In any consignment, all the filters of the same grade and manufactured at one time, shall constitute a lot.

D-1.2 Samples shall be tested for each lot for ascertaining the conformity of the lot to the requirements of this specification.

D-1.3 The number of filters to be chosen from the lot shall depend upon the size of the lot and shall be in accordance with col 1 and 2 of Table 4.

TABLE 4 SAMPLING PLAN AND CRITERIA FOR CONFORMITY

Lot Size (1)	Sample Size (2)	Acceptance No. (3)
Up to 25	3	0
26 to 100	5	0
101 to 150	8	1
151 to 300	13	1
301 and above	20	2

D-1.4 The filters shall be selected from the lot at random and in order to ensure the randomness of selection, procedures given in IS : 4905-1968 'Methods for random sampling' may be followed.

D-2. Number of Tests

D-2.1 The number of filters selected shall be tested for finish and workmanship (**4.1**), construction (**4.2**), leakage (**4.3**), working pressure (**4.4**), pore size index (**4.5**), uniformity (**4.6**), and air-permeability (**4.7**).

D-3. Criteria for Conformity

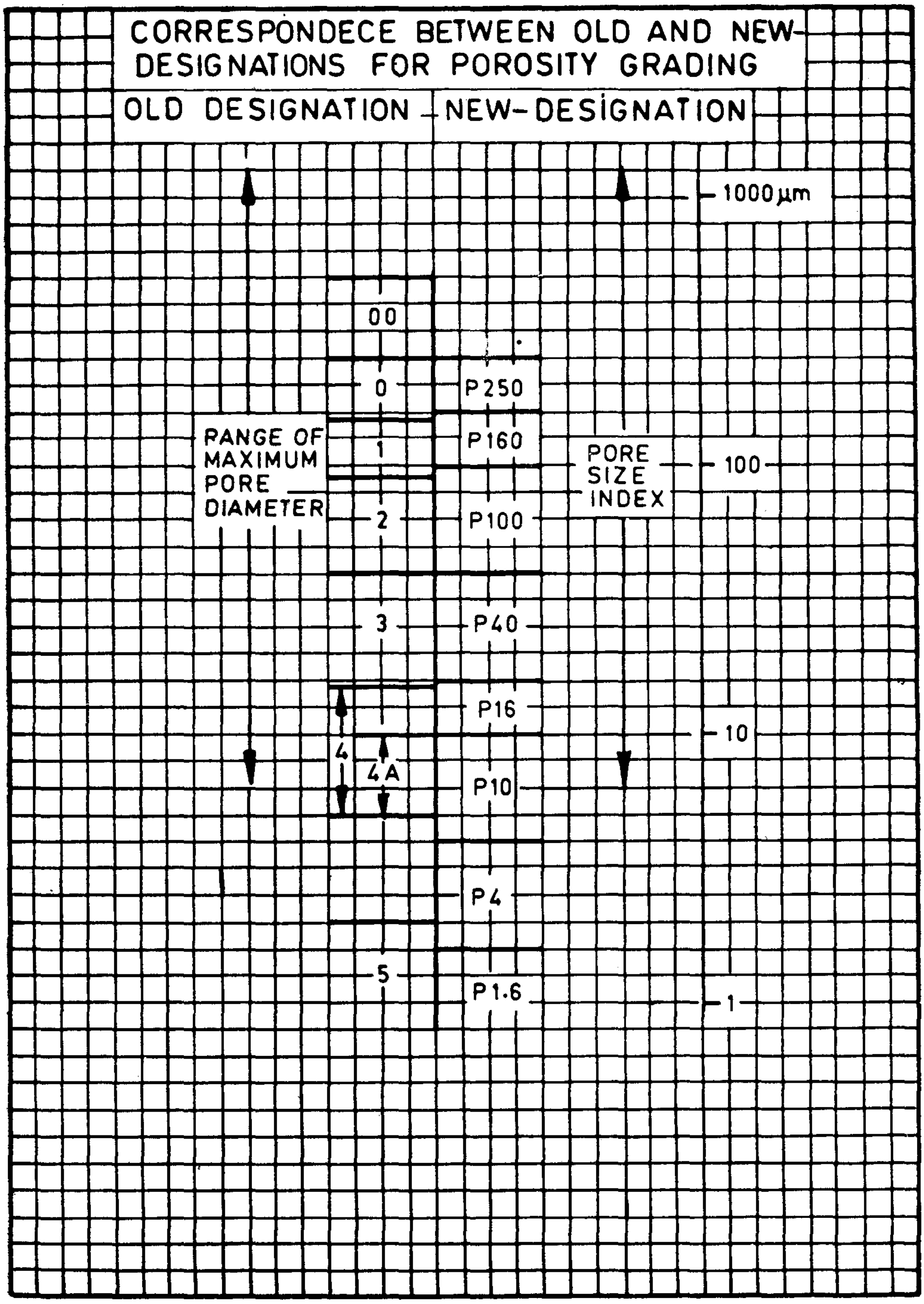
D-3.1 The filter shall be considered as defective if it fails to satisfy any of the requirements given in **D-2.1**. The lot shall be considered as conforming to the requirements of the standard if the number of defective filters found in the sample is less than or equal to the corresponding acceptance number in col 3 of Table 4.

EXPLANATORY NOTE

The system for porosity grading and designating laboratory sintered (fritted) filters was of classification in grades from G-00 to G-5. The International Organization for Standardization (ISO) has come out with new designations of porosity grading P 1.6 to P 250 and has published ISO 4793-1980 Laboratory sintered (fritted) filters — Porosity grading classification and designation The Technical Committee responsible for preparing this standard decided to align it with ISO and to assist the purchaser and user of the laboratory sintered (fritted) filters, the changes are shown graphically in Appendix E.

APPENDIX E

(*Table* 1)


CORRESPONDECE BETWEEN OLD AND NEW-DESIGNATIONS FOR POROSITY GRADING
OLD DESIGNATION
NEW-DESIGNATION
1000 µm
00
0
P250
1
P160
RANGE OF MAXIMUM PORE DIAMETER
PORE SIZE INDEX
100
2
P100
3
P40
P16
4
4A
10
P10
P4
5
P1.6
1

Printed at New India Printing Press, Khurja, India